

CHAPTER 24

Natural Products (Secondary Metabolites)

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CHAPTER OUTLINE

- Introduction
- 24.1 Terpenoids
- 24.2 Synthesis of IPP
- 24.3 Prenyltransferase and terpene synthase reactions
- 24.4 Modification of terpenoid skeletons
- 24.5 Toward transgenic terpenoid production
- 24.6 Alkaloids
- 24.7 Alkaloid biosynthesis
- 24.8 Biotechnological application of alkaloid biosynthesis research
- 24.9 Phenylpropanoid and phenylpropanoid-acetate pathway metabolites
- 24.10 Phenylpropanoid and phenylpropanoid-acetate biosynthesis
- 24.11 Biosynthesis of lignans, lignins, and suberization
- 24.12 Flavonoids
- 24.13 Coumarins, stilbenes, styrylpyrones, and arylpyrones
- 24.14 Metabolic engineering of phenylpropanoid production: a possible source of enhanced fibers, pigments, pharmaceuticals, and flavoring agents

Introduction

Natural products have primary ecological functions.

Plants produce a vast and diverse assortment of organic compounds, the great majority of which do not appear to participate directly in growth and development. These substances, traditionally referred to as **secondary metabolites**, often are differentially distributed among limited taxonomic groups within the plant kingdom. Their functions, many of which remain unknown, are being elucidated with increasing frequency. The **primary metabolites**, in contrast, such as phyto-sterols, acyl lipids, nucleotides, amino acids, and organic acids, are found in all plants and perform metabolic roles that are essential and usually evident.

Although noted for the complexity of their chemical structures and biosynthetic pathways, **natural products** have been widely perceived as biologically insignificant and have historically received little attention from most plant biologists. Organic chemists, however, have long been interested in these novel phytochemicals and have investigated their chemical properties extensively since the 1850s. Studies of natural products stimulated development of the separation techniques, spectroscopic approaches to structure elucidation, and synthetic methodologies that now constitute the foundation of contemporary organic chemistry. Interest in natural products was not purely academic but rather was prompted by their great utility as dyes, polymers, fibers, glues, oils, waxes, flavoring agents, perfumes, and drugs. Recognition of the biological properties of myriad natural products has fueled the current focus of this field, namely, the search for new drugs, antibiotics, insecticides, and herbicides. Importantly, this growing appreciation of the highly diverse biological effects produced by natural products has prompted a reevaluation of the possible roles these compounds play in plants, especially in the context of ecological interactions. As illustrated in this chapter, many of these compounds now have been shown to have important

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Table of Contents Natural Products The Secondary Metabolites

1. Understanding the eBook Natural Products The Secondary Metabolites
 - The Rise of Digital Reading Natural Products The Secondary Metabolites
 - Advantages of eBooks Over Traditional Books
2. Identifying Natural Products The Secondary Metabolites
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Natural Products The Secondary Metabolites
 - User-Friendly Interface
4. Exploring eBook Recommendations from Natural Products The Secondary Metabolites
 - Personalized Recommendations
 - Natural Products The Secondary Metabolites User Reviews and Ratings
 - Natural Products The Secondary Metabolites and Bestseller Lists
5. Accessing Natural Products The Secondary Metabolites Free and Paid eBooks

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 - ePub, PDF, MOBI, and More
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 - Natural Products The Secondary Metabolites Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Natural Products The Secondary Metabolites
 - Highlighting and Note-Taking Natural Products The Secondary Metabolites
 - Interactive Elements Natural Products The Secondary Metabolites
 8. Staying Engaged with Natural Products The Secondary Metabolites
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Natural Products The Secondary Metabolites
 9. Balancing eBooks and Physical Books Natural Products The Secondary Metabolites
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Natural Products The Secondary Metabolites
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Natural Products The Secondary Metabolites
 - Setting Reading Goals Natural Products The Secondary Metabolites
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Natural Products The Secondary Metabolites
 - Fact-Checking eBook Content of Natural Products The Secondary Metabolites
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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